

Our Goal: Designated Swimming Waters in Region 5 Will Be Swimmable

Most water at beaches is safe for swimming; however, there are potential risks associated with the quality of the water. Beach water should be tested for the presence of disease-causing microorganisms. Monitoring of beach water quality by local health and environmental agencies is necessary to warn citizens when there is a problem. When bacteria levels in the water are found to be too high, these agencies notify the public of beach advisories or closings, as swimming or playing in water that is polluted may make people sick. The people who are most at risk are children, the elderly and individuals with weakened immune systems.



Photograph Courtesy of Michigan Travel Bureau

A beach advisory or closing typically occurs when monitoring results indicate that water quality may pose a health risk. About 28 percent of the Great Lakes beaches that participated in the National Beach Health Survey (315 of approximately 580 beaches contributed information) had at least



one advisory or one area closed during the 2001 swimming season. The main reason given for the advisories and closings was elevated bacteria levels. For more information on Great Lakes beach closings, see: <http://www.epa.gov/grtlakes/beach>.

Region 5 and state public health and environmental agencies are committed to reducing problems

Beach Programs in Ohio

In Ohio, much work is being done along the Lake Erie shoreline to ensure biologically safe swimming areas. Many agencies are involved in identifying factors that adversely affect beach water. Some local health departments have instituted programs specifically aimed at locating and eliminating failed septic systems that might contribute to high bacteria counts at public beaches. Other organizations are concentrating on controlling the migratory habits of numerous waterfowl (seagulls, geese, and so on) to minimize their effects on beach water quality. By employing intense sampling surveys and sophisticated DNA fingerprinting technologies, researchers are seeking the sources of disease-causing bacteria on Lake Erie beaches. In recent years, high levels of fecal coliform and E. coli bacteria have resulted in Lake Erie beach postings warning people to enter the water only at their own risk. Two Lake Erie Commission-funded projects, one at Maumee Bay State Park in the western Lake Erie basin and one in the Cleveland area, are working to identify and eliminate the sources of these pathogens. The goal is to ensure the health of all that enjoy our Lake Erie beaches.

associated with disease-causing microorganisms at recreational beaches. Agencies in charge of protecting the health of swimmers typically monitor water quality at beaches. Most water quality standards for beaches are based on the risk of human exposure to pathogens. Because pathogen detection is difficult and expensive, pathogens themselves are usually not measured directly. Instead, one or more "indicator organisms" are measured and used to predict the presence of pathogens.

What Are the Major Problems Causing Beach Closings?

When pathogen levels exceed water quality standards, beach managers post signs advising the public that it may not be safe to swim, or post "No Swimming" notices to protect human health. Beach water can be polluted by bacteria and other microorganisms like viruses and parasites. The most frequent sources of disease-causing microorganisms are combined and sanitary sewer overflows, polluted storm water runoff, sewage treatment plant malfunctions, boat sewage and malfunctioning septic systems. Levels of pollution in beach water are often much higher during and immediately following rainstorms because water draining to the beach often carries sewage from overflowing sewage treatment systems or other contaminants. Rainwater flows to beaches after running off farmland, lawns, streets, construction sites and other urban sites and thus can carry animal waste, fertilizer, pesticides, trash and many other pollutants.

CSOs and SSOs

A combined sewer overflow (CSO) occurs when the flow capacity of a sewer system designed to carry both sanitary sewage and storm water is exceeded and a mixture of domestic waste and storm water is discharged untreated into surface water. A sanitary sewer overflow (SSO) occurs when untreated sewage is unintentionally released from a sanitary sewage collection system before treatment. Both CSOs and SSOs occur most often during excessive wet weather conditions such as heavy rains.

CSOs are a remnant of the country's early infrastructure and are typically found in older communities in the Northeast, Great Lakes states and the Pacific Northwest. Region 5 has 364 CSO communities, which is about 47 percent of the national total. Approximately 135 of these

Decreasing Fecal Coliform Contamination in the Chippewa River in Minnesota

The Chippewa River is one of 13 major tributaries to the Minnesota River, which ranks as one of the most threatened rivers in the nation. The Chippewa contributes significant sediment, nutrients and harmful bacteria to the Minnesota River, and the lower reaches of the Chippewa exceed the fecal coliform standard. But with the help of a state \$300,000 Clean Water Partnership grant—and \$418,700 in matching and in-kind support—the Chippewa River Watershed Project is tackling a 10-year program to develop a network of people and projects focused on improving water quality. Program sponsors, including four county governments, hope to make the Chippewa River a major recreational resource in the Minnesota River basin.

The strategies for improving water quality have included

- Working with the sugar beet industry (the largest industry in the watershed).
- Publishing a newsletter for 8,000 residents.
- Consulting with Glenwood, a city in the watershed, on a storm water management plan.
- Encouraging soil and water conservation districts to participate in the Conservation Reserve Enhancement Program.
- Conducting water quality monitoring across the watershed.
- Offering seminars for farmers on nutrient management.
- Conducting a Chippewa River tour during a River Leaders Summit.

CSO communities discharge to the Great Lakes, and the Region 5 states are giving high priority to development and implementation of CSO controls for these communities.

EPA and the Region 5 states have taken a number of steps to control CSOs and bring CSO communities into compliance with the Clean Water Act. EPA's 1994 CSO policy requires communities to implement nine minimum controls, which are measures that can reduce CSOs and their effects on water quality without requiring significant engineering studies, construction activity or financial investment. The policy also calls for communities to develop CSO long-term

CSOs in EPA Region 5

There are currently 364 communities in the Region 5 states with CSOs (Illinois - 107, Indiana - 107, Ohio - 93, Michigan - 52, Minnesota - 3 and Wisconsin - 2). In its 2001 Report to Congress on CSO policy implementation, EPA reports that in Region 5, 79 percent of CSO communities have been required to implement the nine minimum controls, and 56 percent have been required to develop CSO LTCPs. An additional 30 percent of the communities were required to develop CSO controls outside the LTCP process.

Planning is only one step in the process of bringing CSOs under control. Following review and approval of LTCPs, communities must finance and build the controls, and this may take a number of years. Nevertheless, there have been many successes in controlling CSOs in Region 5. For example,

- In Chicago, the Tunnel and Reservoir Plan, construction of which began in the 1970s, has reduced CSO frequency from nearly 100 per year to fewer than 15 per year. Discharges reaching Lake Michigan are now an infrequent occurrence.
- Under the Rouge River Wet Weather Demonstration Project, CSO controls in 16 communities in the Rouge River watershed have removed CSOs from 30 miles of the river. In other areas where treatment basins have been built, treated overflows occur approximately one to seven times per year, whereas previously, untreated overflows occurred 50 times per year.
- Minneapolis and St. Paul have completed the separation of their formerly combined sewers.
- Numerous other communities have either designed or constructed CSO controls, including sewer separation, CSO storage for later treatment at a wastewater treatment plant or stand-alone treatment systems for wet weather events.
- In 1988, Michigan identified 90 municipal entities with untreated CSO discharges. Through the efforts of these municipalities and the state, CSO discharges have been eliminated or adequately treated in 36 communities. All the remaining 54 communities have Long-Term CSO Control Programs, most of which are in advanced stages of implementation. Based on the number of completed projects and the advanced stages of most of the remaining LTCPs, a large percentage of the historically untreated CSO discharge has been eliminated or is being adequately treated. Treatment includes disinfection to protect public health.

control plans (LTCP) that provide for compliance with the technology- and water quality-based requirements of the Clean Water Act.

Together with its state partners, EPA is continuing to improve the inventory and assess the impact of Region 5 CSOs and SSOs, particularly those near beach areas. These efforts will strengthen the ability to target CSOs and SSOs that may be contributing to beach closings in order to reduce or eliminate them as sources of pollution.

Beach closings cannot in all cases be directly linked to CSOs or SSOs. Such pollutant sources, in fact, are only part of the story. Pollution of coastal waters and beaches is a complex issue. Many conditions can affect beaches, including weather, wind direction, water currents, water depth, beach location and geography, nearby animal and bird habitats, and human activity. Recent research indicates that bacteria and pathogens existing in nearshore areas and at beaches may multiply when weather and water conditions provide

a suitable environment, thus creating unsafe conditions for beach users.

Pinpointing the sources of beach contamination takes time and consistent teamwork, as is evidenced by the efforts of an interagency task force convened to investigate beach closings along the Indiana shoreline of Lake Michigan. Beginning in 1997, this group of 19 public and private-sector organizations coordinated E. coli monitoring at 60 locations in northwest Indiana. The task force identified a variety of suspected sources of contamination ranging from a mobile home park on an upstream tributary to malfunctioning waste facilities in a state park on the lakeshore. EPA and other state and local regulatory agencies have used various methods to address contamination from these sources, including both direct enforcement and compliance assistance.

What are We Doing to Address the Problems?

EPA's BEACH Program

EPA's Beaches Environmental Assessment Coastal Health (BEACH) Program is aimed at reducing health risks for swimmers by minimizing their exposure to disease-causing microorganisms at recreational beaches. For example, EPA is providing storm water controls and is working with states and various stakeholders to control boat sewage discharges. Moreover, EPA is working to improve beach programs across the country. The goal is to improve beach monitoring, strengthen recreational water quality standards, improve public notification procedures and find ways to eliminate pollution sources. One important factor is the proximity to beaches of CSOs and SSOs. Region 5 is working with its state program partners to inventory all known CSOs and SSOs, particularly



Photograph by David Riecks; Photograph Courtesy of Illinois-Indiana Sea Grant

those near Great Lakes beach areas. Region 5 and the state programs will then target CSOs and SSOs as well as confined animal feeding operations that may be contributing to beach closings in order to

reduce or eliminate them as sources of pollution. Moreover, EPA's Great Lakes National Program Office developed a Great Lakes Strategy that includes promoting clean and healthy beaches. Many key actions are outlined in the strategy, including working with state, local and tribal governments and federal agencies to reduce or eliminate beach closings and trying to identify pollution sources for all monitored beaches.

BEACH Act Grant Program

EPA is making \$10 million in grants available to eligible coastal states, tribes and territories in order to protect public health at the nation's beaches. These grants are available to coastal and Great Lakes states for developing programs to monitor water quality at beaches and to notify the public when water quality problems exist. During the first year of BEACH Act development grants, each of the coastal and Great Lakes states that applied for the grants received \$58,600 to develop a beach monitoring and notification program.

In March 2002, the availability of additional BEACH Act development grant funding was announced. Region 5 grants will be allocated as follows based on swimming season length, number of coastal miles, and beach use: Illinois - \$248,615; Indiana - \$206,670; Michigan - \$287,556; Minnesota - \$204,631; Ohio - \$227,879; and Wisconsin - \$228,396. Over the next few years, EPA is authorized to issue additional funds to eligible states, tribes, territories and local governments in order to support development and implementation of beach monitoring and notification programs.

Research

A great deal of research is needed to improve the science supporting recreational water quality monitoring programs. A major problem with current monitoring procedures is that the process of collecting and preparing samples, incubating

Beach Programs in Illinois

Most of the Illinois beaches on Lake Michigan are monitored for water quality in an effort to ensure the safety of the thousands of people that use them. In Lake County, water at the nine beaches on Lake Michigan is sampled daily by the Lake County Health Department. Water at the 32 beaches operated by the Chicago Park District is sampled from Monday through Friday, and test results are posted daily at www.chicagoparkdistrict.com/index.cfm/fuseaction/swim.swimreport.

The Illinois Department of Public Health will be working with several local and state entities to meet the objectives of an EPA developmental grant. Although the number of beach closings in Illinois is a concern, efforts are underway to determine the causes of the high bacterial counts at the beaches, and there have been no reports of illness associated with swimming at the beaches.



Photograph by Carol Y. Swinehart, Michigan Sea Grant Extension

bacteria, conducting the analyses and reporting the results requires 24 to 48 hours before problems can be detected and notifications issued. As a result of this delay, a beach can be left unprotected for swimmers to become exposed to contaminants, or a beach can be closed when the problem has already passed. Methods are needed to identify water quality problems before exposure takes place. Moreover, research is needed on the health risks associated with swimming in polluted water. Swimmer patterns, such as time spent in the water and the amount of water swallowed, need to be assessed. Also, research needs to be conducted in order to determine what types of respiratory illnesses may be caused by swimming in contaminated water and whether cuts in a swimmer's skin may contribute to infection.

The Region 5 states currently use different standards and measurement methods to determine the need for beach closings. As a result, there are limitations on the ability to compare frequencies

Beach Monitoring Grants in Michigan

The Michigan Department of Environmental Quality (MDEQ) has provided grants to local health departments for monitoring water at public beaches for E. coli. An average annual amount of approximately \$150,000 has been awarded to local health departments for this purpose over the past few years. MDEQ has applied for federal funds so that it will be possible to provide local health departments with additional money to develop and enhance their beach monitoring programs. MDEQ has also developed a beach monitoring web site (<http://www.deq.state.mi.us/beach>) where local health departments can make the results of their beach monitoring available to the public.

of exceedances of microbiological standards in order to evaluate trends in recreational water quality. Given these limitations, the frequency of beach postings has traditionally been used as an indicator of recreational water quality. However, microbial standard exceedances may be a better measure of the actual health risk associated with recreational waters. By April 2004, all the Region 5 states intend to adopt bacteria criteria at least as protective as the EPA Ambient Water Quality Criteria for Bacteria issued in 1986. EPA's annual voluntary beach survey program provides an indication of the status of beach health.

For more information about EPA's BEACH Program, visit the BEACH Watch web site at www.epa.gov/OST/beaches. The web site contains information about individual beaches, protection programs, workshops and results of annual national beach surveys as well as links to other web sites for regional beach projects.



Photograph by Patrick T. Collins,
Michigan Department of Natural Resources



Photograph Courtesy of Wisconsin Travel Bureau

Local Beach Programs in Wisconsin

Wisconsin has formed a BEACH Act workgroup composed of local and state health officials and interested parties to develop a comprehensive beach monitoring and public notification plan. Several efforts to collect water quality data are already underway at Wisconsin beaches. The information collected will support assessment of short-term increases in bacteria resulting from storm events.

Wisconsin Department of Natural Resources Beach Pilot Project

The Bureau of Watershed Management, in conjunction with the Bureau of Parks, designed a beach water testing pilot project for the duration of the 2001 swimming season. The pilot project involved weekly sampling of beach water at Harrington Beach State Park, Kohler-Andrae State Park and Point Beach State Forest.

City of Milwaukee EMPACT Study of Water Quality at Local Streams and Public Beaches (1998 and 1999)

The City of Milwaukee Health Department (MHD) partnered with the City of Racine Health Department (RHD), the U.S. Geological Survey, the University of Wisconsin-Milwaukee Great Lakes WATER Institute and other organizations to study five beaches in Milwaukee and Racine. The targeted locations were Bradford Beach, McKinley Beach and South Shore Beach in Milwaukee and Zoo Beach and North Beach in Racine.

Water at beach sites in Milwaukee and Racine was sampled from Monday through Friday during the 2002 swimming season. Additional samples were collected on Saturdays and Sundays if high *E. coli* counts were anticipated based on the previous week's sample results. MHD sampled Bradford, McKinley and South Shore Beaches, while RHD sampled the water at North Beach (in four different places), Zoo Beach (in three different places) and the English Street outfall.

Kenosha County Division of Health

Water at Kenosha's Eichelman Beach is sampled from Monday through Thursday. If *E. coli* standards are exceeded, additional samples are collected every day of the week until test results are again within the standards.

Ozaukee County Health Department

The Ozaukee County Health Department collects water samples at Port Washington Beach twice each week to monitor water quality. In addition, the following information is being collected at South Shore Beach in Milwaukee and North Beach in Racine: rainfall; wind speed and direction; air temperature; wave height; and water temperature, turbidity and conductance. This information and the Port Washington Beach monitoring data will be used to help identify short-term pathogen increases and pathogen increases resulting from storm events.